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XX. *Anatomical description of the foot of a Chinese female.* By BRANSBY BLAKE COOPER, Esq., Surgeon to Guy's Hospital. Communicated by PETER MARK ROGET, M.D., Secretary to the Royal Society.

Read March 5, 1829.

A SPECIMEN of a Chinese foot, the account of which I have the honour to lay before the Royal Society, was removed from the dead body of a female found floating in the river at Canton. On its arrival in England it was presented to Sir ASTLEY COOPER, to whose kindness I am indebted for the opportunity of making this curious dissection. Without entering into an inquiry whether this singular construction, and as we should esteem it hideous deformity of the Chinese female foot, had its origin in Oriental jealousy, or was the result of an unnatural taste in beauty; I shall content myself with describing the remarkable deviations from original structure, which it almost every where presents. It may be proper, however, to remark, that as this conformation is the result of art, commenced at the earliest age and exercised on the persons of females only, we should naturally expect to find the most perfect specimens among those of the highest rank. Now as this body was found under circumstances which lead me to suppose that it was one of the lower orders, the measured proportions of the foot are therefore to be considered somewhat above the more successful results of this cruel art when completed on the feet of those in more exalted stations of life.

To an unpractised eye, the Chinese foot has more the appearance of a congenital malformation than the effect of art, however long continued; and although no real luxation has taken place, yet at first sight we should either consider it as that species of deformity vulgarly called club-foot, or the result of some accidental dislocation, which from ignorance and want of surgical skill, had been left unreduced.

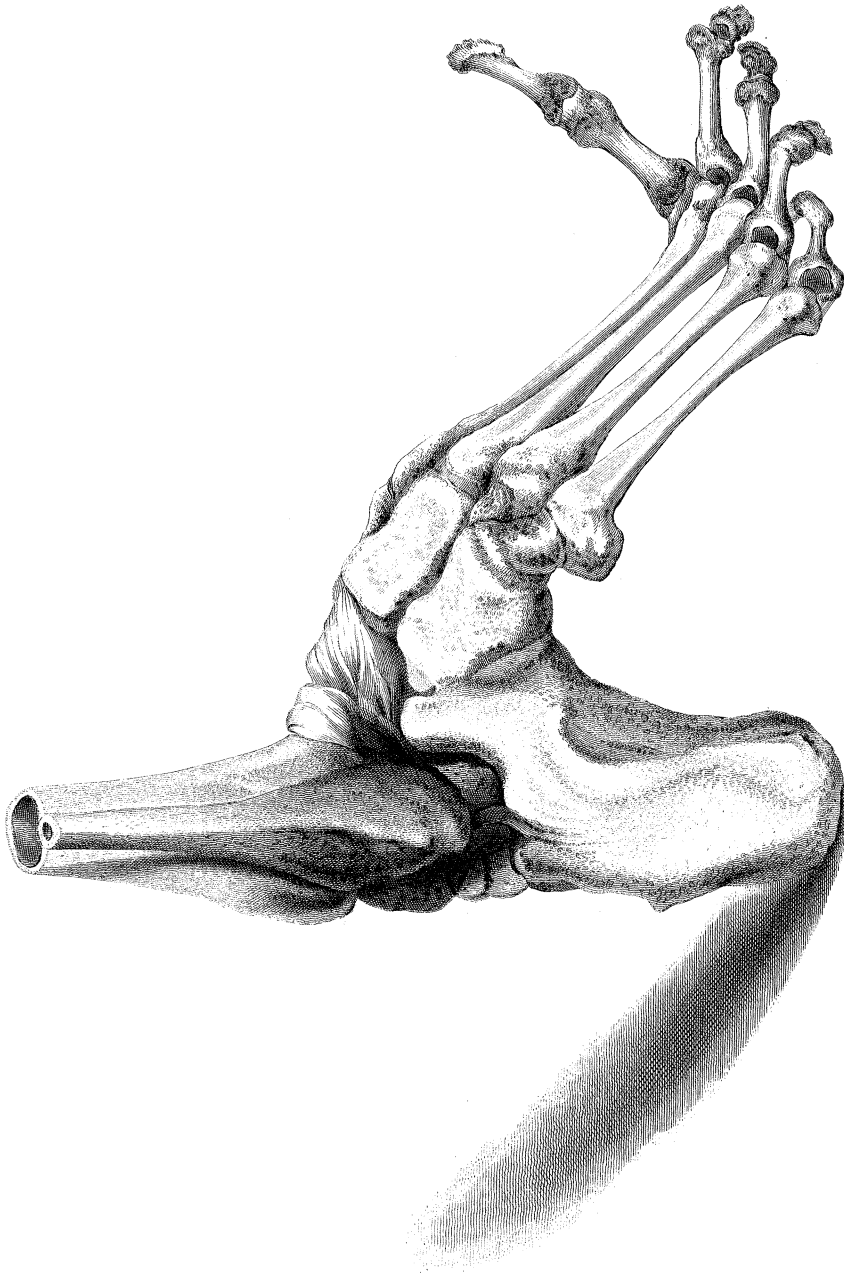
From the diminutive size of the foot, the height of the instep, the want of

breadth, and above all, the extremely dense nature of the cellular tissue of the foot, it is evident that progression must at all times be difficult; and even the poising of the body when in the erect position, must require unusual exertion of muscular power, which, considering the disadvantages with which these muscles have to contend, is a matter of no small astonishment.

From the heel to the great toe the foot is unusually short, not exceeding five inches, and is said in some instances to measure even less than this; and the great toe itself, which in its natural and free state projects in a straight forward direction, is bent with a peculiar abruptness upwards and backwards, whilst the remaining toes, with the exception of the first phalanx of the second and third, are doubled in beneath the sole of the foot, so as to leave scarcely any breadth at this part of the foot, which in the unconstrained limb is commonly the broadest; and the striking shortness of the heel scarcely projecting beyond the line of the leg, which itself descends upon the foot at a considerable obliquity from behind forwards, imparts an appearance to the foot, as if it were kept in a state of permanent extension. The upper surface of the foot is very convex; but its convexity is irregular and unnatural, presenting a sudden and prominent projection just anterior to the external malleolus, and above the outer extremity of a deep cleft which traverses the sole of the foot. But as it is in the sole that the most remarkable alterations are produced, I shall give a particular description of it first.

#### *Sole of the Foot.*

In describing the sole, we will suppose the foot to rest upon the heel, as it would do were the individual placed horizontally upon the back. In this view we observe the great toe bent backwards towards the leg, and immediately beneath the articulation of its two phalanges the second toe is so twisted under it that its extremity reaches to the inner edge of the foot; its nail occupies the centre of this position, having a considerable projection of integument beyond it. Next, but still anterior to the ball of the great toe, are the two extreme phalanges of the third toe; they are placed more obliquely than the phalanges of the second toe, and consequently do not reach so far inwards across the foot. The nail of this toe is somewhat nearer its extremity, but more completely on its anterior surface, so as nearly to touch the edge of the pre-



ceding one. A corn which appears on the space external and posterior to the nail of this toe, seems to indicate that, as the point of the fore part of the foot which is first subjected to pressure. We come now to the ball of the great toe, which separates the toes already described, from the two outer ones: it does not present its usual full convex appearance, but is flattened on its under surface, and compressed from before backwards by the position of the third and fourth toes. The position of the two remaining toes is very remarkable, and differs essentially from that of the others: for while in them only two phalanges are bent under the plantar region of the foot, in these all the phalanges are doubled beneath it in such a manner as to produce a visible depression in the external edge of the foot. The fourth toe is placed more obliquely than the third, with its nail very much contracted, and is situated on its anterior edge; a large corn presents itself more external to the nail than in the third toe. The last or fifth toe stretches in a transverse direction across the under surface of the foot, and forms the anterior boundary to a deep cleft which occupies the centre of the sole. This toe is so much expanded as to appear the largest; externally and posterior to its nail it has two corns, placed much in the same manner as that on the fourth toe. But the strangest feature in this deformity is the cleft, or hollow just mentioned; it is very deep, with a slight obliquity from without inwards, and extends transversely across the whole breadth of the foot between the toes and the heel. To judge from its appearance, one might suppose that the heel and toes had been forcibly brought together, so as considerably to diminish the whole length of the foot, and to convert its natural longitudinal hollow into that deep concavity. The heel which forms the other boundary of the cleft, presents a large square surface, if not entirely flattened, yet with a striking diminution of convexity, so as to suggest the probability that it affords the principal point of support in progression; a surmise which is further corroborated by the great density of the skin of this part.

*Dorsum of the Foot.*

The external character of the foot is completely altered here also; the direction of the leg downward and forward, forming before an obtuse angle with the foot, so as to give it an appearance of permanent extension, is the first cir-

cumstance worthy of notice. The dorsum rises with an unusual convexity, not only from behind forward, but also from side to side : it affords a distinct protuberance situated just before the external malleolus, and above the outer extremity of the cleft in the sole, which is here very conspicuous ; anterior to this eminence, the dorsum presents a plane surface facing outwards, till it slopes off rapidly beneath where the toes are turned under the sole. There is but a trifling alteration in the aspect of the inner surface of the dorsum ; this side of the foot having undergone but little distortion : but the manner in which the dorsum is united with the great toe deserves yet to be particularly noticed. A considerable angle distinguishes their point of junction, resulting from the dent or hollow, which the abrupt direction of the great toe upwards and forwards produces upon that surface. In this view we have the dorsum of the great toe with its aspect directly upwards ; whilst the inner surface of the first phalanx of the second toe has its dorsum turned outwards. Only a small portion of the inner surface of the third toe can be perceived in this view, whilst the remaining toes are buried beneath the foot. Posteriorly there is little to remark, beyond the extreme shortness of the heel, which is not flatter, but wider than in the natural condition.

The integuments covering the heel are unusually dense, hard, and resisting, and the cuticle is of a remarkable thickness. The subcutaneous structure resembles rather the fatty sole of a horse's foot than any human tissue. The skin which covers the rest of the sole presents a corrugated appearance, and is somewhat thicker than in an ordinary foot : but in those places where it had been defended from external pressure by the intervention of the toes, which passed under it, it does not deviate from the natural construction.

On the dorsum, the integuments offer nothing unusual : unless it be that the nail of the great toe, as might be anticipated from constant compression, is rendered particularly convex from side to side.

The other nails are not visible in this aspect of the foot.

The tendons do not appear to have undergone any change, further than as their direction depended upon the altered position of the bones.

It is however in the skeleton of the foot that we observe the greatest changes produced by art. The powerful effect of long continued pressure over the direction even of the bones is here very striking.

The position of the os calcis is very remarkably altered: instead of the posterior projection which usually forms the heel, a straight line is preserved in this direction, not deviating from the line of the tibia; and the projecting point which forms in an ordinary foot the most posterior process, and into which the tendo Achillis is inserted, touches the ground and becomes the point d'appui for sustaining the whole weight of the body. The articular surface of the calcis, in connection with the cuboid bone, is about half an inch anterior to, and two inches above this point; while the astragalar joint is behind, and somewhat below, the calco-cuboidal articulation; consequently the direction of the os calcis (in its long axis) instead of being from behind forwards, is from below upwards, with the slightest possible inclination forwards. The most prominent parts of the instep are the round head of the astragalus, and the cuboidal articulation of the os calcis. From this the remaining tarsal bones slope downwards at nearly a right-angular inclination to join the metatarsal bones, whose obliquity is still downwards, until they rest on their phalangeal extremities.

The length between the os calcis where it touches the ground, and the most anterior part of the metatarsal bone of the great toe, is 4 inches.

The length of the foot including the toes  $5\frac{1}{4}$  inches.

The height of the instep  $3\frac{1}{2}$  inches.

Thus the arch of the foot has a span of two inches and a quarter with the height of two inches, which space is filled up with the condensed cellular substance before described.

The cleft of the sole traverses the foot at this place, and is three inches in depth. The width of the foot at its broadest part is barely two inches.

The points of support are the os calcis, the anterior extremity of the metatarsal bone of the great-toe, and the dorsal surface of the fourth and fifth toes, which are bent under the foot so as to press the ground at this part.

Such are the anatomical particulars of this singular deformity; and though Nature has, by providing an accumulation of fat, thickening the skin and cuticle, and widening the surface of the heel, done her utmost to rectify the evil consequences of an unnatural custom, yet the awkward gait of a person attempting to walk on such deformed members may be easily imagined. Under such circumstances, in order to preserve equilibrium in an attempt to walk, it must be necessary to bend the body forwards in an uneasy position,

and at the expense of a muscular exertion, which in ordinary progression is not put forth. To what extent the general health of the unfortunate individual thus deprived of the natural means of exertion may be affected, is a curious subject of inquiry, and remains I believe to be ascertained.

I may be permitted to add, that the existence of this extraordinary custom, though familiar to our ears, is presented in a forcible light to our imagination by such a specimen as I have the honour to present to the Royal Society.

In offering to the Royal Society this brief sketch of the dissected foot, I do not pretend to attach to the subject any more importance than it deserves; nevertheless I have thought it would be considered as curious, and calculated to interest scientific men. And further, as its description has hitherto formed a desideratum in our accounts of anatomical curiosities, I have thought that my endeavour to supply it would not be unacceptable.